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- From: Commanding Officer, Navy Environmental Health Center  
To: Commander, Atlantic Division, Naval Facilities Engineering Command,  
Code 1823, Norfolk, VA 23511-6287
- Subj: MEDICAL REVIEW OF INSTALLATION RESTORATION PROGRAM  
DOCUMENTS FOR MARINE CORPS BASE, CAMP LEJEUNE, NORTH  
CAROLINA
- Ref: (a) Baker Environmental, Inc., Transmittal ltr 14 June 93
- Encl: (1) Medical Review of Draft Remedial Investigation Report for Operable Unit No. 2  
(Sites 6, 9, and 82), Marine Corps Base, Camp LeJeune, North Carolina
1. Medical review of the Draft Remedial Investigation Report for Operable Unit No. 2  
(Sites 6, 9, and 82), Marine Corps Base, Camp LeJeune, North Carolina has been  
completed. Our comments are provided in enclosure (1).
  2. The technical point of contact is noted in the enclosure. We are available to discuss the  
enclosed information by telephone with you and, if desired, with you and your contractor.  
We are also available to provide health-related review for future documents associated with  
this site.
  3. If you require additional assistance, please coordinate with Ms. Sheila A. Berglund, P.E.,  
Head, Installation Restoration Program Support Department at 444-7575, extension 430.

J. J. EDWARDS

**MEDICAL REVIEW OF  
DRAFT REMEDIAL INVESTIGATION REPORT FOR  
OPERABLE UNIT NO. 2 (SITES 6, 9, AND 82)  
MARINE CORPS BASE, CAMP LEJEUNE, NORTH CAROLINA**

**General Comments:**

1. The draft document entitled "Draft Remedial Investigation Report for Operable Unit No. 2 (Sites 6, 9, and 82), Marine Corps Base, Camp Lejeune, North Carolina," dated June, 1993 was provided to the Navy Environmental Health Center (NAVENVIRHLTHCEN) for review on 18 June 1993. The report was prepared for Atlantic Division Naval Facilities Engineering Command by Baker Environmental, Inc.
2. Review comments and recommendations are provided below. The most significant discrepancies noted are the elimination of pathways (e.g., the Wallace Creek and Bear Head Creek sediment and surface water pathways for the current scenario) without adequate justification, and the presentation of insufficient information in the human health risk assessment for consumption of fish.
3. The technical point of contact for this review of the draft remedial investigation (RI) report is Ms. Andrea Lunsford, Head, Health Risk Assessment Department, Environmental Programs Directorate, NAVENVIRHLTHCEN, who may be contacted at (804) 444-7575 or DSN 564-7575, extension 402.

**Review Comments and Recommendations:**

1. Page ES-15, "Executive Summary" subsection entitled "Nature and Extent of Contamination: Site 6, Lot 203," paragraph 1

Comment: The text states that polychlorinated biphenyl (PCB) levels exceed 1000 micrograms per kilogram (ug/kg) only at soil borings SB24, SB26, and SB38. The significance of the 1000 ug/kg level for PCBs is not addressed in the RI report (i.e., it is not stated whether or not this is a comparison value and from where it was derived).

Recommendation: Explain the significance of the 1000 ug/kg level for PCBs and, if available, provide an appropriate reference for this value.

2. Page 1-10, Section 1.3.2 (Confirmation Study), subsection 1.3.2.1 (Site 6: Groundwater Sampling), paragraph 2

Comment: The text states that carbon disulfide was detected at a concentration of 10 ug/L in well 6GW6. Carbon disulfide is not further mentioned in the text (i.e., the significance of this

Enclosure (1)

level is not discussed). Carbon disulfide is a common laboratory contaminant. This may be justification for eliminating it from consideration as a chemical of concern (COC) although it is not specifically stated.

Recommendation: Discuss the significance of the level of carbon disulfide measured in well 6GW6. If it is to be eliminated from any further evaluation, provide an appropriate justification for its elimination.

3. Page 2-16, Section 2.4.3.2 (Drilling Procedures), subsections entitled "Shallow Drilling Procedures" and "Sampling Procedures;" pages 6-50 through 6-57, Tables 6-2 through 6-8 (Soil Data Summary for...)

Comments:

a. Throughout the document, there is inconsistent use of the terms "surface soil" and "subsurface soil":

(1) The "Shallow Drilling Procedures" section states that two different sampling schemes were employed: one for samples collected from exploratory soil borings and another for borings advanced for monitoring well installation. Exploratory soil samples are stated to have been obtained from "ground surface to six inches" and then "at continuous two-foot intervals (starting at one-foot) until borings were terminated at the approximate depth of the water table."

(2) The "Sampling Procedures" section states that "surface (0 to 6 inches below ground surface (bgs) and subsurface (deeper than one foot)" soil samples were collected for laboratory analysis.

(3) Tables 6-2 through 6-8 provide a summary of soil data. Results are summarized for surface soil and subsurface soil. Surface soil is described as "0-2 feet" and subsurface soil as "below one foot." The overlap in the depths is confusing and warrants explanation. It cannot be readily determined if only those soil samples collected at a depth of 0-0.5 foot have been used for the surface soil pathway analysis or if depths up to 2 feet bgs were used.

(4) Appendix C ("Summary of Soil Sampling Investigation") lists sampling intervals as 0-0.5 feet, 1-3 feet, 3-5 feet, 5-7 feet, etc.

b. EPA guidance as presented in documents such as *Risk Assessment Guidance for Superfund, Volume I, Human Health Evaluation Manual (Part A)*, December 1989, (RAGS manual), recommends surface soil samples be collected at depths of 0-to-6 inches. The Agency for Toxic Substances and Disease Registry

(ATSDR) *Public Health Assessment Guidance Manual* (1992) (PHA manual) defines surface soil samples as those collected at 0-to-3 inches, and subsurface soil samples as those taken at depths greater than 3 inches. ATSDR uses these criteria in developing public health assessments (PHAs).

c. Discrepancies between EPA health risk assessments (HRAs) and PHAs can occur because of these differences in sample characterization. ATSDR PHAs can indicate that "few" or "no" surface soil samples have been taken if the surface soil samples were collected at depths greater than 3 inches. To facilitate correlation between PHAs and HRAs, and to minimize costs associated with redundant sample collection and analysis, we recommend 0-to-3 inches as the norm for surface soil sample collection.

Recommendations:

a. Clarify the definitions of "surface soil" and "subsurface soil."

b. Ensure that soil sample characterizations are consistent throughout the report.

c. Specifically state the soil sampling depth(s) used for surface soil pathways.

d. Collect future surface soil samples at 0-to-3 inches bgs.

4. Pages 2-53 through 2-57, Section 2.4.8 (Ecological and Aquatic Survey), subsection 2.4.8.1 (Fish and Crabs), subsection entitled "Sampling Procedures"

Comments:

a. This subsection discusses the collection of fish and crab samples upstream, downstream, and adjacent to Operating Unit (OU) 2 in Wallace and Bear Head Creeks. However, a rationale for selecting the particular sampling locations is not provided. It is not known whether these locations are known harvest areas. If they are, it should be so stated.

b. The EPA guidance manual *Assessing Human Health Risks from Chemically Contaminated Fish and Shellfish*, (1989) states "Sampling locations should generally be located in known harvest areas. However, additional stations in relatively uncontaminated reference or control areas should also be sampled."

Recommendations:

a. Provide the rationale for selecting the specific

sampling locations.

b. State whether or not the fish sampling locations are known harvest areas.

c. Perform any additional sampling efforts needed to assess risks from consumption of fish and/or shellfish in known harvest areas as well as in control areas.

5. Page 6-1, Section 6.0 (Public Health Assessment)

Comments:

a. The title of the risk assessment section of this report (Section 6.0) is "Public Health Assessment." The Introduction (subsection 6.1) states that "Section 6.0 presents the Public Health Assessment (PHA) or Risk Assessment for OU 2." The terms "public health assessment" and "risk assessment" are generally recognized as being applicable to two **different** (i.e., discrete) documents. The public health assessment (PHA) is an analysis and statement of the public health implications posed by the facility or site under consideration; it is developed by health professionals at the Agency for Toxic Substances and Disease Registry (ATSDR). A health risk assessment (HRA) (often shortened to "risk assessment") is a qualitative and quantitative procedure by which the nature and magnitude of risks to public health are characterized, according to EPA requirements and protocols. Risk assessments are the product of site investigations and/or RIs conducted by the EPA, other federal agencies, states, or potentially responsible parties.

b. In the "Endnotes for Chapter 1" of the RAGS manual the following statements are made:

(1) "The term "public health evaluation" was introduced in previous risk assessment guidance (EPA 1986f) to describe the assessment of chemical releases from a site and the analysis of public health threats resulting from those releases, and Superfund risk assessments often are referred to as public health evaluations or PHEs."

(2) "The term PHE **should be replaced** by whichever of the three parts of the revised human health evaluation is appropriate: "baseline risk assessment," "documentation of preliminary remediation goals," or "risk evaluation of remedial alternatives."

Recommendation: Change the title of this section to "Baseline Risk Assessment" to correspond with the EPA terminology.

6. Page 6-2, Section 6.0 (Public Health Assessment), subsection 6.1 (Introduction), paragraph 5

Comment: This is the first of many times in the risk assessment that the term "contaminants of concern" (COCs) is used. The RAGS manual defines "chemicals of **potential** concern" (COPC), but does not refer to or define COCs. Section 5.0 of the RAGS manual states that "chemicals remaining in the quantitative risk assessment, based upon [data] evaluation, are referred to as chemicals of potential concern." This suggests that when site-related chemicals are positively identified, and are found at statistically significant levels, they should then be identified as COPC, vice the more absolute "chemicals of concern."

Recommendation: Use standard EPA terminology to refer to site-related contaminants. Refer to COPC, vice COCs.

7. Page 6-4, Section 6.2.1 (Criteria for Selecting Contaminants of Concern), subsection entitled "Applicable or Relevant and Appropriate Requirements (ARARS)"

Comment: This subsection lists both promulgated standards and non-enforceable regulatory guidelines. Since one of the definitions of an ARAR is that it is a **promulgated** standard (i.e., put into effect by formal public announcement, notice or declaration; legally enforceable and generally applicable), this section title should be changed to more accurately reflect the information included (e.g., "ARARs and Other Guidance Concentrations").

Recommendation: Expand the title of this subsection to accurately reflect the information contained within it.

8. Page 6-8, Section 6.2.2 (Selection of Potential Contaminants of Concern), subsection 6.2.2.1 (Soils: Site 6, Lot 201); page 6-52, Table 6-4 (Soil Data Summary Site 6 - Lot 201...); page 6-79, Table 6-29 (Incremental Lifetime Cancer Risk Values...Site 6 Lot 201); and Table 6-30 (Hazard Quotients and Indices...Site 6 Lot 201)

Comments:

a. This section provides justifications for retaining or eliminating COCs from the risk assessment. Lead is not addressed in this section.

b. The text states that "the prevalence of arsenic, chromium, cadmium, manganese and zinc" warrant the retention of these inorganics as COCs. The text justifies the elimination of barium as a COC because barium concentrations are within the range of background concentrations.

c. Table 6-4 provides base-specific background concentrations and results of inorganic positive detections for Site 6, Lot 201. The table indicates that calcium, iron, lead, magnesium, potassium, sodium and vanadium were frequently detected, at concentrations well above background. These chemicals are not listed on Tables 6-29 and 6-30 (the risk summary tables). No justification is provided for their elimination from the list of COCs.

d. Iron, magnesium, calcium, potassium and sodium are essential human nutrients. The RAGS manual states that "Chemicals that are (1) essential human nutrients, (2) present at low concentrations (i.e., only slightly elevated above naturally occurring levels, and (3) toxic only at very high doses (i.e., those that could be associated with contact at the site) need not be considered further in the quantitative risk assessment." Although it is not specifically stated in Section 6.0, this may be the justification for eliminating on of the essential human nutrients.

e. The RAGS manual further states "Prior to eliminating such chemicals from the risk assessment, they must be shown to be present at levels that are not associated with adverse health effects." Sample results for chemicals considered to be essential nutrients should be evaluated in all media to ensure that they are not elevated at levels associated with adverse health effects.

f. Copper, lead and vanadium are not essential human nutrients and should be included in the risk assessment unless sufficient justification is provided for their elimination. Although EPA reference doses (RfDs) are not available to quantitatively assess risks resulting from exposure to lead, a qualitative risk assessment may be performed and/or risks may be assessed through available models (e.g., the EPA Uptake Biokinetic (UBK) Model for lead).

#### Recommendations:

a. Assess risks of exposure to calcium, copper, iron, lead, magnesium, potassium, sodium and vanadium or provide sufficient justification for their elimination from the risk assessment.

b. Evaluate sample results in all media for those chemicals considered to be essential nutrients to ensure that they are not elevated at levels associated with adverse health effects.

9. Page 6-8, Section 6.2.2 (Selection of Potential Contaminants of Concern), subsection 6.2.2.1 (Soils: Site 9); and page 6-49, Table 6-1 (Soil Data Summary Site 9)

Comment: The second paragraph of Section 6.2.2.1 states "The volatile contaminants acetone, 1,1,1-trichloroethane, tetrachloroethene and toluene were detected." The next sentence states that acetone and toluene are believed to be laboratory contaminants and not an indication of site related contamination. However, the text does not elaborate on the elimination of 1,1,1-trichloroethane or tetrachloroethene from the risk assessment. Both of these chemicals have detection frequencies of 1/7. The low frequency may justify their exclusion from the risk assessment; however, this should be specifically stated, as it is for other excluded chemicals.

Recommendation: Provide a justification for the exclusion of 1,1,1-trichloroethane and tetrachloroethene from the risk assessment.

10. Page 6-9, Section 6.2.2 (Selection of Potential Contaminants of Concern), subsection 6.2.2.1 (Soils: Site 6 Lot 203); page 6-53, Table 6-5 (Soil Data Summary Site 6 - Lot 203...); and page 6-3, Section 6.2.1 (Criteria for Selecting Contaminants of Concern), subsection entitled "Prevalence"

Comments:

a. The text states that endrin is considered to be prevalent and retained as a COC whereas alpha chlordane was detected infrequently and therefore is not retained as a COC. Table 6-5 lists the frequency of detection for both of these chemicals as 3/58. It is not clear how the same frequency (i.e., 3/58) can be considered prevalent in one case and infrequent in the other. Other factors may be involved in the elimination of alpha chlordane as a COC; however, they are not specifically stated.

b. Section 6.2.1 states that a frequency of detection equal to or greater than 5 percent **can** warrant the inclusion of a contaminant as a COC. Given this elimination criteria, additional justification should be provided for eliminating a chemical with a frequency of detection greater than 5 percent.

c. Four semivolatiles (acenaphthene, anthracene, fluorene and phenanthrene) are listed on Table 6-5; however, Section 6.2.1 does not address the elimination or inclusion of these chemicals as COCs. It appears that they have been excluded as chemicals of concern, since calculated cancer risk values and hazard quotients associated with exposure to these chemicals are not listed on Tables 6-31 and 6-32. The frequency of detection for acenaphthene, anthracene, and fluorene is 2/28, or 7 percent;



however, it appears that these three chemicals have been eliminated from consideration based upon their frequency of detection (other chemicals with this frequency have also been eliminated). The frequency of detection for phenanthrene is 6/28 (21 percent); therefore, the justification for its elimination is not known.

Recommendations:

a. Provide justification for the elimination of alpha chlordane, acenaphthene, anthracene, fluorene and phenanthrene from the risk assessment.

b. Either restate the frequency of detection exclusion criteria to accurately reflect the actual elimination criteria used or provide additional justification for elimination of any chemical detected at frequencies greater than 5 percent.

11. Page 6-10, Section 6.2.2 (Selection of Potential Contaminants of Concern), subsection 6.2.2.1 (Soils: Site 6 (Wooded Areas and Ravine) and Site 82); and page 6-55, Table 6-7 (Soil Data Summary Site 6 (Wooded Areas and Ravine) and Site 82....)

Comments:

a. Editorial. The second paragraph states "The pesticides 4,4-DDD, 4,4-DDD, 4,4-DDT, dieldrin, and endrin were prevalent in the wooded and ravine areas." The second "4,4-DDD" should be changed to "4,4-DDE."

b. Table 6-7 lists the frequency of positive detects for endrin as 2/83 (i.e., 2 percent), which is below the 5 percent prevalence value used to determine inclusion of a chemical as a COC. However, endrin is retained as a COC. Endrin should be removed from the statement that addresses pesticides with high prevalence. Also, further justification should be provided for retaining endrin as a COC.

Recommendations:

a. Correct the text in the second paragraph to indicate "4,4-DDE."

b. Remove endrin from the statement that addressing pesticides with high prevalence.

c. Provide justification for retaining endrin as a COC.

12. Page 6-17, Section 6.3.2 (Exposure Pathways), subsection 6.3.2.4 (Surface Water/Sediments)

Comments:

a. This document does not contain a description or discussion of current or anticipated future recreational activities associated with Wallace and Bear Head Creeks. Some recreational activities are apparently presumed to occur because some exposure calculations are presented. However, insufficient information is provided to conclusively determine what activities are/can be supported by these water bodies.

b. Section 6.3.4.2 states that Wallace Creek and Bear Head Creek present "potential future human exposure risks through surface water and sediment pathways." The text does not specifically state the types of recreational activities that are expected to occur in the future.

c. Recreational activities currently conducted in these creeks are not described. Current scenario pathways involving exposures to surface sediment and water are not calculated; however, Tables 6-44 and 6-45 present risk data calculated for consumption of fish. Tables 6-37 through 6-43 only list a future scenario for sediment and surface water pathways. If fishing is currently being conducted in the creeks, it seems logical that a current scenario involving contact with surface water and sediment is also likely. Justification for the elimination of current sediment and surface water pathways is not provided.

Recommendations:

a. Describe the types of recreational activities that are currently known to occur. Discuss recreational activities that are expected to occur in the future.

b. Discuss the relationship between fishing and surface water and sediment exposures. Provide justification for the elimination of a current surface water and sediment pathway.

\* 13. Page 6-18, Section 6.3.3 (Quantification of Exposure), paragraph 4

Comments:

a. Section 6.3.3 states that the 95 percent upper confidence level (95% UCL) for the lognormal distribution is used for each contaminant in a given data set for quantifying potential exposure. It further states that "In cases where the 95 percent UCL for a contaminant exceeds the maximum detected value in a given data set, the maximum result will be used in the estimate of exposure of the 95 percent UCL." Although

calculation of the 95 percent upper confidence level of the mean (RME) follows RAGS manual guidance, presenting a one-point estimate of risk (i.e., the RME) may result in an upwardly biased assessment of risk.

b. Recent EPA guidance indicates that a single number used to represent the health risk to an individual or population may hamper the risks manager's ability to make an informed risk decision. A Deputy Administrator memorandum dated 26 February 1992 ("Guidance on Risk Characterization for Risk Managers and Risk Assessors") states: "Regarding exposure and risk characterization, it is Agency policy to present information on the range of exposures derived from exposure scenarios and on the use of multiple risk descriptors (i.e., central tendency, high end of individual risk, population risk, important subgroups, if known) consistent with terminology in the attached Appendix and Agency guidelines." The guidance further states: "This guidance applies to all Agency offices. It applies to assessments generated by EPA staff and to those generated by contractor's for EPA use.

3. Recently, EPA published final guidelines for exposure assessment in the Federal Register (57 FR No. 104, Friday, May 29, 1992). This guidance reiterates that "**Several** statistical estimators of exposure should be identified, e.g., the 50th, 90th, or 95th percentiles. The distribution should reflect exposures, not just concentrations." Although the guidance discusses the concept at length, the bottom line is that risk estimates for both the upper bound **and average** case should be presented.

Recommendation: Provide quantitative risk estimates for the average case as well as the RME case.

14. Page 6-19, Section 6.3.4 (Calculation of Chronic Daily Intake), paragraph 5

Comment: The text states that an exposure duration of 25 years was used to estimate working lifetime exposures for base personnel. There is no explanation as to how this working lifetime duration value was derived. The required term of employment for civil service workers to retire at age 55 is 30 years; the term of employment for active duty military is often greater than 25 years. Thus it is unclear as to which type of worker the 25 years applies.

Recommendations:

a. Provide an explanation of the derivation of the 25 year working lifetime duration value.

b. If an alternate exposure duration value is adopted,

recalculate the intake equations and the risk values appropriately.

15. Page 6-20, Section 6.3.4 (Calculation of Chronic Daily Intake), subsection 6.3.4.1 (Incidental Ingestion of Surface Soil: Base Personnel), paragraph 2

Comments:

a. The surface soil ingestion rate for base personnel conducting maintenance activities at OU 2 is assumed to be 100 mg/day. The text does not describe the maintenance operations that will be conducted.

b. The EPA default soil ingestion value for an industrial site (i.e., an occupational, 8-hour per day site use) is 100 mg/day. However, the EPA default soil ingestion value for a construction excavation scenario is 480 mg/day. Construction activities are not addressed in Section 6.3.4.1; however, Section 6.3.4.2 ("Base Personnel") states that "During construction activities, there is a potential for base personnel to absorb COCs by dermal contact."

c. Attachment B of OSWER Directive 9285.6-03 (March 1991) suggests the use of 480 mg/day to estimate a soil ingestion rate for conducting residential yard work; the directive then states that these assumptions may also be used to model similar exposures in the work place. It is not known if any of the workers at OU 2 perform routine lawn maintenance activities. If they are performed, the 480 mg/day value should be employed.

Recommendations:

a. Address current and future activities conducted by OU 2 workers and state whether or not yard work is performed.

b. If construction activities and/or yard work is currently conducted or is anticipated to be conducted in the future, calculate risks from soil ingestion based on a soil ingestion rate of 480 mg/day.

16. Page 6-33, Section 6.4 (Toxicity Assessment)

Comments:

a. It is stated that "Section 6.4 will review the available toxicological information for potential COCs." This statement suggests that chemical specific toxicological data will be presented; however, Section 6.4 provides only a generic discussion of toxicity.

b. Chemical specific toxicological information could not be

found in this risk assessment.

c. Section 7.7.1 of the RAGS manual states "A short description of the toxic effects of each chemical carried through the assessment in non-technical language should be prepared for inclusion in the main body of the risk assessment. Included in this description should be information on the effects associated with exposure to the chemical and the concentrations at which the adverse effect are expected to occur in humans."

Recommendation: Provide a toxicity section in this report which includes a description of the toxic effects of each chemical carried through the risk assessment.

17. Page 6-44, Section 6.6 (Sources of Uncertainty), subsection 6.6.4 (Compounds Not Quantitatively Evaluated)

Comments:

a. This ("Uncertainty") section states that trichloroethene, 1,1,1-trichloroethane, phenanthrene, copper, and lead were not quantitatively evaluated because of the "unavailability of toxicity information." Consistent with this stated rationale, these chemicals are not included on the "cancer risks" and "hazard quotients and indices" tables (Tables 6-29 through 6-45). However, in the absence of quantitative calculations, qualitative evaluations of these chemicals are not presented.

b. Chemicals not included in the quantitative risk assessment as a result of missing toxicity information may represent a significant source of uncertainty. Section 8.4.1 (page 8-18) of the RAGS manual states "For substances detected at the site, but not included in the quantitative risk assessment because of data limitations, discuss possible consequences of the exclusion on the risk assessment."

Recommendations:

a. Provide a qualitative evaluation for all chemicals for which insufficient toxicity data exists to conduct a quantitative evaluation.

b. Specifically address the uncertainty introduced as a result of excluding these chemicals from the quantitative risk assessment.

18. Page 6-18, Section 6.3.2 (Exposure Pathways), subsections 6.3.2.6 (Biota); page 6-32, Section 6.3.4 (Calculation of Chronic Daily Intakes), subsection 6.3.4.10 (Biota); and page 6-48, Section 6.7 (Conclusion), subsection 6.7.8 (Biota); pages 6-94 and 6-95, Tables 6-44 and 6-45); and Appendix K ("Dose Response Calculations and Spreadsheets")

Comments:

a. The discussions in the human health risk assessment (Section 6.0) concerning exposure to biota are scanty and inconsistent:

(1) The discussions related to human consumption of biota do not specifically address the existence or non-existence of a future exposure pathway. Nor do they identify or describe the population(s) anticipated to be exposed.

(2) Tables 6-44 and 6-45 only present calculations for a **current** exposure scenario for the consumption of biota from Wallace Creek. However, subsection 6.3.2.6 states that "**current and future** adult residents could catch and consume fish from Wallace Creek, thereby being exposed to COCs accumulated in the edible portions of fish."

(3) Subsection 6.3.4.10 presents a chronic daily intake equation associated with potential ingestion of fish taken from the **New River**. Appendix K, which provides the calculation spreadsheets for cancer and noncancer risks, only contains spreadsheets for **Wallace Creek** and **Bear Head Creek**. If fish were taken from the New River, the results should be presented. If not, the statement referring to the New River should be changed or deleted.

(4) Recommendation #5 of the Executive Summary stated that recreational fishing within Wallace Creek and Bear Head Creek should be banned due to elevated levels of PCBs and pesticides in fish tissue. This recommendation is not included in Section 7.0 (Conclusions and Recommendations) of this remedial investigation report. It is not known if the risk assessor eliminated the future scenario based upon this recommendation.

b. The text does not specifically state that the data used for the ecological assessment and the data used for assessing risks from fish consumption in the human health risk assessment are the same data. Any data used for the assessment of human health risks should be presented in Section 6.0.

c. Section 6.7.8 states that "Local **adults** can be exposed to site-associated potential COCs through the ingestion of fish from Wallace Creek or Bear Head Creek." It is not known why children are not anticipated to be exposed via the fish

consumption pathway.

d. Neither the risk summary tables (Tables 6-44 and 6-45) nor the text in the human health risk assessment section, present data regarding the types of fish and the particular parts of the fish sampled. The type of sample used to assess human health risks resulting from fish consumption is significant.

e. The potentially exposed population has not been characterized with respect to general method(s) of food preparation and parts of fish eaten. The majority of fish consumers in this area are likely to consume only the fish fillet. However, this should be determined. There are populations that consume all edible portions of the fish, or prepare the fish in such a way that contaminants in other portions of the fish are of concern (e.g., some populations remove the viscera and boil the rest of the fish).

Recommendation:

a. Clarify the existence or non-existence of a future pathway involving the consumption of fish.

b. Present the results for fish taken from the **New River**, or change the statement which refers to the **New River**.

c. Include data tables of chemical concentrations in fish used to assess human health risks in Section 6.0.

d. Provide a rationale for eliminating children from the fish consumption exposure pathway or change the opening sentence to include children as well as adult in the fish consumption population.

e. If children are included, recalculate the risk from fish consumption to include child exposure default parameters.

f. Characterize the potentially exposed populations with respect to method of food preparation and parts of fish eaten.

19. Pages 6-85 through 6-93, Tables 6-35 through 6-43  
(...Potential Current and Future Exposures)

Comment: The titles for Tables 6-35 through 6-43 indicate that **current and future** risk values are presented; however, subheadings provided for each of these tables indicate that only future potential risk scenarios are actually presented. The table titles should be changed to accurately reflect the information they contain.

Recommendation: Change the table titles indicated to accurately reflect the information they contain.